American Fern Journal 93(4):203–206 (2003)

Shorter Notes

The Common Staghorn Fern, *Platycerium bifurcatum*, Naturalizes in Southern Florida.—*Platycerium bifurcatum* (Cav.) C. Chr. is a popular ornamental staghorn fern that is widely cultivated in the tropics and subtropics and under protection in cooler climates. Native to Australia, New Guinea and Indonesia (Jones, D. L. 1987. *Encyclopedia of Ferns*. Timber Press, Portland, Oregon.), it thrives out-of-doors in southern Florida, where large cultivated plants suspended by chains hung from residential trees or houses are a frequent sight. These ferns are exceptionally abundant in some areas. For instance, at least 19 large cultivated *P. bifurcatum* plants grow in 7 of the 11 yards on one street in Ft. Lauderdale, Broward County, southeastern Florida.

Early in 2001, young sporophytes of a staghorn were observed growing on a live oak tree (*Quercus virginiana* Mill.) in a residential neighborhood in Ft. Lauderdale. By January 2002, one of these plants had grown fertile fronds, enabling it to be identified as *P. bifurcatum*. The same tree bore an estimated 25 younger, non-spore bearing plants. Two large *P. bifurcatum* plants hang from trees across the street, within 50 meters of the colonized tree. About one half mile away, two *P. bifurcatum* plants "volunteered" on a live oak growing next to a yard with many large spore-producing *P. bifurcatum* plants. These colonizations appear to be a local phenomenon related to the close proximity of fertile plants.

Later in January 2002, I found *P. bifurcatum* growing in a native live oak forest at Tree Tops County Park in southwestern Broward County. During a three hour survey of the park, a total of 19 plants were located on 11 large live oaks. Three plants had fertile leaves, and two of these were large clumps of plants more than one meter across with numerous basal and foliage fronds, and remaining 16 sporophytes were of various sizes but all had at least one foliage frond. Four of the 11 trees had more than one plant, all of which were on separate branches. Most of the plants were on the upper or lateral sides of the larger branches 4.5 to 9 m off the ground. These 11 host trees were scattered within a forest stand about 600 meters in length. Tree Tops Park is approximately 11 km west of the Ft. Lauderdale residential oaks with the colonizing *P. bifurcatum* plants.

In January 2002, I also surveyed the mixed hardwood forest at the Broward County Flamingo Environmentally Sensitive Lands Site, about eight km. west of Tree Tops Park. A single medium-sized plant of *P. bifurcatum* with multiple basal and foliage fronds was found during the two-hour search of the site. No fertile leaves were apparent on this plant, which was growing in a live oak about five meters above the ground.

An unpublished list of the plants at Tree Tops Park and the adjacent Pine Island Ridge Preserve, compiled by P. Howell in 1995, included *P. bifurcatum* (P. Howell pers. com.). The plant was a single young sporophyte found

growing on an oak the forest in 1994 (P. Howell, pers. com.), which suggests that the fern was naturalizing in the park by that date.

The age of the colonizing staghorn plants may be judged by their size. Under optimal conditions, it can take *P. bifurcatum* up to a year to grow from a spore to a young sporophyte to initiate foliage fronds, and another 3–4 years to produce fertile fronds (B.J. Hoshizaki, pers. com.) Multiple basal fronds can be produced after about two years. This suggests that 3 of the 19 plants at Tree Tops Park are about a year old, 5 are 2 years or older, 8 are between 2 and 5 years old, and three are probably more than 5 years old. Because the growing conditions in Broward County are probably suboptimal due to cool and dry winter weather, the plants are probably older than they appear.

Both Tree Tops Park and the Flamingo Preserve have residential areas within one km of the park which could be spore sources. The source of spores for the Ft. Lauderdale residential oak colonization is likely nearby cultivated plants that occur within 100 meters of the tree. It is not known whether *Platycerium* gametophytes are able to self fertilize (B. J. Hoshizaki, pers.com.). The ability to self fertilize would make naturalization easier because only one spore would be needed to establish a plant and population. Self fertilization seems desirable in epiphytic ferns growing on tall trees in dense forests. Ferns that are long distance dispersers are more likely to self fertilize (Peck, J., C. Peck and D. Farrar. 1990. Amer. J. Bot 80:126–126.). The two climbing ferns invasive in Florida, *Lygodium japonicum* (Thunb. *ex* Murray) Sw. and *L. microphyllum* (Cav.) R. Br., can self fertilize (Lott, M. S., J. C. Volin, R. W. Pemberton and D. F. Austin. 2003. Amer. J. Bot. 90:1144-1152.).

In Australia, *P. bifurcatum* occurs in tropical and subtropical Queensland, and extends into temperate New South Wales (Jones, D. L. 1987. *Encyclopedia of Ferns*. Timber Press, Portland, Oregon.). The fern has survived –9°C on Mount Boss in New South Wales and it occurs at 240–450 m near Sydney (Graf, A. B. 1992. *Tropica, Color Cylopedia of Exotic Plants*, 4th Edition. Roehrs Co., East Rutherford, New Jersey.). Sydney is located about ca. 34 degrees south latitude, whereas Broward County, Florida lies at ca. 26 degrees north. A commercial nursery of *P. bifurcatum* in West Palm Beach County, just north of Broward County, has survived many freezing temperatures during its 40 years of operation (D. Rowett, pers. com.). The nearby weather station at Loxahatchee recorded low temperature between –3 and –4°C for eight years between 1961 and 1990 (Southeast Regional Climate Center, 2002. sercc@cirrus.dnr.state.sc.us). Older staghorn plants may be able to tolerate freezes because their rhizomes are insulated by the masses of base fronds and sometimes have the ability to produce new base and foliage fronds if the old ones are killed. Florida's dry season can kill young plants, but larger plants are resistant to drought (Dave Rowett, pers. com.). These factors suggest that plants, should persist in southern Florida and based on low-temperate tolerance, *P. bifurcatum* should be able to extend it distribution northward.

If *P. bifurcatum* plants become very dense on trees, they could displace native epiphytes. In the oak forests presently colonized, most of the branches, including those with *P. bifurcatum* are covered with resurrection fern

(*Pleopeltis polypodioides* Humb. & Bonpl. ex Willd.), and five species of bromeliads (*Tillandsia balbisiana* Schult. & Schult.f., *T. fasiculata* Sw., *T. recurvata* (L.) L., *T setaceae* Sw., *T. usneoides* (L.) L., *T. utriculata* L.) are common. Two of these bromeliads, *T. fasciulata* and *T. utriculata*, are classified as endangered by the State of Florida because of the attack of an exotic weevil which specifically feeds on bromeliads (Coile, N.C. 2000. Notes on Florida's endangered and threatened plants. Florida Division of Plant Industry, Bureau of Entomology, Nematology and Plant Pathology-Botany Section Contribution No. 38, 3rd edition. p.122.). If *P. bifurcatum* becomes abundant in other preserves, which are rich in rare endangered epiphytic orchids and bromeliads, it could become more serious threat. Its presence in Tree Tops and Flamingo represents another exotic species in natural areas already plagued with abundant introduced species. It is a more obviously non-native component of the forests, than are the exotic figs (*Ficus* spp.) and shoebutton ardisia (*Ardisia elliptica* Thunb.), which have native counterparts. Given the incipient naturalization, despite an apparent long history of cultivation, and its modest abundance, it seems unlikely that *P. bifurcatum* will approach the severity of other invasive ferns in Florida. Examples of such include *Lygodium microphyllum* (Cav.) R. Br. (Pemberton, R. W. and A. Ferriter. 1998. Amer. Fern J. 88:165–175.), *L. japonicum* (Thunb.) Sw., *Nephroplepis cordifolia* (L.) C. Presl., *N. multiflora* (Roxb.) F.M. Jarrett *ex* C.V. Morton, and *Tectaria incisa* Cav.. All of these are Category 1 invasive exotics (Austin *et al.*, http://www.fleppc.org/99list.htm).

Platycerium bifurcatum has probably had a long history of cultivation in southern Florida. The 1887 sales catalogue of the Royal Palm Nursery, Oneca, Manatee Co., lists *P. alcicorne* (Willem.) Tardieu. This species may have actually been *P. bifurcatum*, a similar species (Hoshizaki, B. J. and R. C. Moran. 2001. *Fern Grower's Manuel.* Timber Press, Portland, OR.). *Platycerium bifurcatum* tolerates Florida's subtropical climate better than *P. alcicorne*, native of eastern Africa and Madagascar (Hoshizaki and Moran, 2001). While *P. bifurcatum* may have naturalized previously, it did not persist. The plant's many horticultural forms (Hoshizaki and Moran, 2001,) and tropical to warm temperate distribution (Jones, 1987,) suggests considerable genetic variation. With increased population and residential gardening, it is likely that there are many more genotypes of *P. bifurcatum* plants present today and this may account for the current naturalization. *Platycerium bifurcatum* has naturalized in Hawaii, where it was documented to occur on three islands in 1991 (Wilson, K. A. 1996. Pacific Sci. 50:127–141.).

With the naturalization of *P. bifurcatum* in Florida, the number of exotic ferns and fern allies in the state is now 34 (Wunderlin, R. P. 1998. *Guide to the Vascular Plants of Florida.* University Press of Florida, Gainesville). Wunderlin lists 32 species as introduced, to which *Salvinia minima* Baker can be added because of the recent recognition of the plant's exotic status (Jacono, C. C., T. D. Davern and T. D. Center. 2001. Castanea 66:214–226.). These 34 represent about one-third of Florida's fern species, the same proportion of naturalized seed plants in the state. Thus there seems to be no difference in the

ability of ferns and seed plants to naturalize in Florida. In Hawaii, however, where about half of the flora is comprised of naturalized species, only 19% of the ferns are naturalized (Wilson, K. A. 1996. Pacific Sci. 50:127–141; 2002. Amer. Fern J. 92:179–183), suggesting that ferns are less likely than seed plants to naturalize on those islands. Both the proportion of ferns that are naturalized and the severity of associated problems are greater in Florida than in Hawaii.

Barbara Joe Hoshizaki, Patricia Howell, Broward County Florida Parks and Recreation, Dave Rowett Just Stags Nursery, Palm Beach Co. Florida, provided helpful information. Robbin Moran, The New York Botanical Garden, and Barbara Joe Hoshizaki kindly reviewed and improved the manuscript.—ROBERT W. PEMBERTON, Invasive Plant Research Laboratory, USDA-Agricultural Research Service, 3205 College Ave., Ft. Lauderdale, FL 33314